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Unmanned Aircraft Systems in the Scout-Reconnaissance Role: Perceptions of U.S. Army Manned and Unmanned Aircraft Communities

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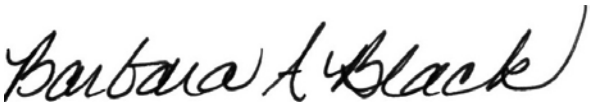

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14. ABSTRACT (Maximum 200 Words): Historically, U.S. Army unmanned aircraft systems (UAS) served as intelligence-gathering platforms. The role of the UAS has recently changed to scout-reconnaissance (SR). The current research effort investigated perspectives of members of Army manned and unmanned aviation communities on capabilities of UAS operators to perform the Army Aviation SR role. A questionnaire addressing perceptions of the capabilities of UAS in SR operations was distributed to 34 U.S. Army helicopter pilots and 31 UAS operators. Pilots and UAS operators agreed that UAS operators must assume a more active SR role and that this role was essential for UAS. UAS operators indicated that UAS will be able to perform many of the roles currently performed by manned scout and attack helicopters. However, pilots indicated that the role of UAS primarily will be to assist and support helicopters and not to supplant the manned role. Likewise, the majority of respondents indicated that each of eight SR mission skills was appropriate for both manned aircraft and unmanned aircraft although response patterns between pilots and UAS operators differed for most skills. The differences in perceptions indicated a need for additional tactical-skills training for UAS operators and opportunities for joint training with UAS operators and pilots.

15. SUBJECT TERMS: Unmanned Aircraft Systems, Manned-Unmanned Teaming, Army Aviation, Scout-Reconnaissance, reconnaissance-attack helicopter operations, training UAS operators.

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UNMANNED AIRCRAFT SYSTEMS IN THE SCOUT-RECONNAISSANCE ROLE: PERCEPTIONS OF U.S. ARMY MANNED AND UNMANNED AIRCRAFT COMMUNITIES

EXECUTIVE SUMMARY

Research Requirement:

Proponency for Unmanned Aircraft Systems (UAS) was transferred from Army Military Intelligence to the Army Aviation Branch in 2003. Since that time, the UAS role in the Army has been changing from the relatively passive intelligence-gathering mission to the more active scout-reconnaissance (SR) and attack missions. One consequence of this transition is that UAS operators will now be required to execute SR missions, which were previously performed by crews of scout helicopters, such as the OH-58D. UAS operators will have to team with manned aircrews in order to perform the SR role. Even though manned-unmanned teaming (MUM-T) doctrine and tactics are emergent and will be implemented in the near future, UAS operators and manned aircrews are currently separate communities, and undergo separate programs of training, which can create differences in the perception of the centrality of their respective roles in aviation SR operations. The intent of the present investigation was to determine the extent to which perceptions of the role of UAS in the SR mission differed (or were similar) between members of the manned and unmanned aviation communities. Understanding the elements of the SR mission on which perceptions differ can help guide the development of MUM-T training by identifying potential knowledge gaps or capabilities misconceptions.

Procedure:

A 16-item questionnaire addressing perceptions of the relative importance of the tactical roles of manned aircraft and UAS was distributed to 34 U.S. Army helicopter pilots and 31 UAS operators. The questionnaire consisted of three parts. The first part comprised eight questions concerning the present and future effectiveness of UAS in the SR role. The second part asked whether each of eight specific SR mission skills were most appropriately performed by manned aircraft, UAS, or both manned aircraft and UAS. The final part allowed respondents to provide open-ended comments on the items and to address related issues not covered by the questionnaire.

Findings:

In general, both the manned respondents and the unmanned respondents agreed that the role of UAS in the SR mission would expand. UAS personnel indicated that UAS will be able to perform many if not most of the SR roles addressed in the present research and currently performed by manned scout and attack helicopters. By contrast, pilots of manned helicopters indicated that the role of UAS primarily will be to assist and support the manned mission and not to supplant the manned role. Most respondents indicated that both UAS and manned aircraft were appropriate to perform all eight SR mission skills. Even with the differences in perceptions of UAS roles, it nonetheless appeared that most of the mission skills were perceived as being appropriate for MUM-T.

Utilization and Dissemination of Findings:

These findings provide important feedback to decision makers regarding the perceived present and future tactical roles of manned and unmanned aircraft by experienced operators of both aircraft types. Knowledge of current attitudes toward capabilities of UAS could provide insight on the part of training developers who must devise strategies for training manned and unmanned aircrews to work together as players in MUM-T. The findings also point to the need to specify more precisely the respective roles of manned and unmanned team members for each SR mission skill before UAS can fully participate in MUM-T. Results of this research effort were briefed to the TRADOC Capabilities Managers for Reconnaissance-Attack and for Unmanned Aircraft Systems, on 10 February 2012.

UNMANNED AIRCRAFT SYSTEMS IN THE SCOUT-RECONNAISSANCE ROLE: PERCEPTIONS OF U.S. ARMY MANNED AND UNMANNED AIRCRAFT COMMUNITIES

CONTENTS

Page

LIST OF TABLES

Unmanned Aircraft Systems in the Scout-Reconnaissance Role: Perceptions of U.S. Army Manned and Unmanned Aircraft Communities

Introduction

Background

The use of unmanned aircraft by the United States military has evolved from pilotless target drones to reconnaissance and surveillance platforms to offensive weapons platforms (Goebel, 2010). The historic intelligence, surveillance, and reconnaissance (ISR) mission of Army unmanned aircraft changed in 2003 when the Chief of Staff of the Army approved the transfer of Unmanned Aircraft Systems (UAS) from Military Intelligence to the Aviation Branch. Since that time, the UAS role in the Army has been changing from the relatively passive ISR mission to the more active scout-reconnaissance (SR) and attack missions. Missions where UAS will be utilized in the near future are the same as those now performed by manned scout and attack Army helicopters (e.g., target designation, route reconnaissance). More importantly, these missions will require UAS and manned aircraft to team during execution. For this reason it is important to understand the perspectives of both manned and unmanned Army Aviation communities regarding the role of UAS in the SR mission.

Even though manned-unmanned teaming (MUM-T) doctrine and tactics are emergent and will be implemented in the near future, UAS operators are currently a separate community from Army aviators. UAS and manned aircrews come from different demographic backgrounds (i.e., training, rank, and experience) which can create differences in the perception of the centrality of their respective roles in aviation SR operations. UAS operators are not selected or trained as aviators and are not officers. In spite of differences in background and training, UAS and manned helicopter crews must now acquire the same skills that scout helicopter (e.g., OH-58D pilots possess. In short, they must learn to work together as members of a manned-unmanned team. As a result, the intent of the present investigation was to determine the extent to which perceptions of the role of UAS in the SR mission differed (or were similar) between members of the manned and unmanned aviation communities. Understanding the elements of the SR mission on which perceptions differ can help guide the development of MUM-T training by identifying potential knowledge gaps or misconceptions of capabilities.

Previous research indicated that initial training of UAS operators emphasized traditional ISR data collection and that UAS operators do not arrive at their first assigned unit prepared to execute the SR mission (Stewart, Bink, Barker, Tremlett & Price, 2011). The unit must retrain operators on most SR skills with on-the-job training. As a result, UAS operators may not fully understand the SR mission and may not have the opportunity to acquire SR skills at home station. Likewise, some SR helicopter pilots may still consider UAS to function best as passive sensor platforms. Although it is difficult to specify in advance how UAS and manned aviation communities perceive themselves relative to one another, it would seem reasonable to suppose, based on the findings of Stewart, et al., that Army aviators would perceive UAS operators as playing a support role at executing SR missions rather than becoming equal-status players in MUM-T. On the other hand, UAS operators may perceive themselves as potentially capable of equal-status participation in MUM-T, if given equivalent SR training.

Technical Objectives and Scope of Research

A potential obstacle to the successful integration of MUM teams is the extent to which distinct manned and unmanned communities exist, each with its own notions and assumptions about the capabilities and roles of the other. The primary objective of this research effort was to determine the degree of consensus and disagreement of the manned and unmanned Army Aviation communities regarding the capabilities and mission-related roles of UAS in the execution of SR missions. To achieve this objective, a brief questionnaire was designed to assess critical issues regarding (a) perceptions of the capabilities and status of UAS in the SR role, (b) the relative roles of UAS and manned aviation for eight SR missions determined to be of critical importance to SR operations.

It is also important to note that, for the present research, input from the unmanned community focused primarily on RQ-7B Shadow operators and Leaders. The RQ-7B Shadow is the Army's most numerous medium-sized UAS and will continue to operate within the ground Brigade Combat Team as well as alongside armed scout and attack helicopters within the new Full-Spectrum Combat Aviation Brigade (FSCAB). Input from the manned community largely came from OH-58D Kiowa Warrior pilots and Leaders.

Method

Participants

Sixty-five participants were recruited on the basis of availability from various organizations, workshops, and courses at Fort Rucker, AL, Fort Stewart, GA, Fort Benning, GA, and Fort Riley, KS. The sample was composed of responses from 34 manned (helicopter) U.S. Army aviators (19 scout-reconnaissance, 8 attack, 7 utility) and 31 U.S. Army UAS operators (25 medium UAS, 6 heavy UAS). All participants were from the active duty population except two Army civilians who were retired aviators. All military respondents had deployed in theater at least one time except for three Privates First Class who were newly-trained UAS operators. Table 1 presents the distribution of rank for manned and unmanned participants. A glance at Table 1 clearly shows no overlap between the two groups due to rank with the only officer rank among the UAS group being a Chief Warrant Officer 1 (CW1). Modal rank for manned is CW3-4 vs. Staff Sergeant for UAS. This reinforces the previous statement concerning demographic and status differences in the respective communities.

Table 1. *Rank Distribution of Respondents by Manned vs. Unmanned Communities.*

Rank	Manned	Unmanned	Total
Major	1	0	1
Captain	7	0	7
Chief Warrant Officer 5	1	0	1
Chief Warrant Officer 4	10	0	10
Chief Warrant Officer 3	11	0	11
Chief Warrant Officer 2	2	0	2
Chief Warrant Officer 1	0	1	1
Sergeant First Class	0	7	7
Staff Sergeant	0	18	18
Specialist / Private First Class	0	5	5
Department of the Army Civilian	2	0	2
Totals	34	31	65

Materials and Procedure

A 16-item pencil and paper questionnaire served as the data collection instrument (see Appendix A). The first eight items were formatted as four-point Likert-type scales with responses for "strongly disagree," "disagree," "agree," or "strongly agree." These eight items were derived from responses to interviews conducted by Stewart, et al. (2011) as well as some general attitudinal items. Participants were asked to place an 'x' in the corresponding point on the scale best representing their perceptions of the relative capabilities of manned aircraft and UAS. The second part of the questionnaire listed eight critical SR skills (Appendix B) identified by Stewart, et al. (2011). Respondents were asked whether each corresponding skill could best be performed by manned aircraft, UAS, or manned aircraft *and* UAS combined (i.e., MUM-T). Respondents were also asked to comment further about the role of UAS in SR missions, if they chose to do so, in order to provide additional input into the results of the research. After providing informed consent, all participants were administered the questionnaire and a background information questionnaire (Appendix C). Participants were allowed 30 minutes to complete both instruments, although no respondents used the entire allotted time.

Results

Analyses of questionnaire items were divided into three parts, and each part compared responses between the manned and unmanned communities. The first set of analyses compared differences in perceptions of the role of UAS in SR missions. The second set of analyses compared differences in the perceptions of appropriateness of selected SR-mission skills for each aircraft type (i.e., manned, unmanned, or both manned and unmanned). Finally, analysis of respondents' open-ended comments was conducted to clarify perceptions of the UAS role in the SR mission. Where inferential statistics were reported, Chi-square analyses were used, and the alpha level was set at .05.

Present and Future Roles of UAS and Manned Aircraft

Perceptions of the role of UAS in SR missions were captured in the first eight items of the questionnaire. For the sake of simplicity and ease of interpretation, the four response categories were collapsed into dichotomous analysis categories (i.e., Disagree and Agree). The frequencies of agreement for each item were compared between manned-helicopter respondents and unmanned (UAS) respondents with 2 X 2 Chi-Square analyses (df = 1 for each analysis). Table 2 shows distributions of responses for each item and also indicates where responses differed between the types of respondents. The patterns of responses depicted in Table 2 fell into three general categories: (a) high consensus between types of respondents and high agreement to the item; (b) high consensus between types of respondents and mixed agreement to the item; (c) no consensus between types of respondents.

Items 1, 2 and 4 fell into the first category of response patterns. Both manned and unmanned respondents agreed to the items. It did not appear controversial to state that UAS would assume a more active role in SR missions (Item 1) and that UAS operators would have to learn to develop the tactical situation once a target was identified (Item 2). Likewise, both the manned and unmanned respondents agreed that UAS participation has made significant contributions to SR operations (Item 4). Interestingly, for Item 4, unmanned respondents were more inclined to disagree (26%) that UASs have made significant contributions to SR operations than were their manned counterparts (12%). Also of note, Item 7 marginally fell into this category of response patterns. Both manned and unmanned respondents more often agreed that UAS operators must assume a more active SR role than merely providing an airborne sensor, but unmanned respondents agreed to this item at a higher frequency than did manned respondents (97% for UAS vs. 77% for manned). So, even though both manned respondents and unmanned respondents agreed that UAS has an important role in SR mission, manned respondents were more likely to view that role as merely providing an airborne sensor.

Item 5 was the lone item in the second category of response patterns. Statistically, both manned respondents and unmanned respondents were equally likely to agree and disagree that the primary role of UAS is as an airborne sensor for manned helicopter crews, who are responsible for dealing with the target. This pattern of response may suggest that there is uncertainty about the role of UAS in SR missions. However, the ambivalence of responses and the seeming contradiction with the pattern of responses on Item 7 may be due to the fact that this item was lengthier and was comprised of more than one idea.

The third category of response patterns represents the highest degree of polarization between the unmanned and manned respondents. Items 3, 6, and 8 were in this category. On Item 3, 71% of the manned respondents disagreed that UAS and manned aircraft eventually will become equal status players in SR operations whereas only 23% of the unmanned respondents disagreed with the statement. Likewise, for Item 8, 76% of the manned respondents agreed that it was unrealistic to expect that the OH-58D and AH-64D aircraft would one day be replaced by unmanned surrogates, but only 27% of unmanned respondents agreed. The pattern of responses was a bit more complex for Item 6. Almost all (i.e., 94%) of manned aviators disagreed that UAS will one day take over the SR role from manned aviation. However, the unmanned

respondents seemed to show ambivalence to the statement with almost an even split (52% agreeing and 48% disagreeing).

In sum, it appeared that there was agreement between manned respondents and unmanned respondents to the idea that UAS will assume a larger role in the SR mission (Items 1, 2, 4, & 7). However, there appears to be disagreement both between and within the manned and unmanned respondents about the exact nature of UAS role (Items 5 & 7). More specifically, there was disagreement among respondents whether UAS should simply be an airborne sensor or should be involved in target acquisition and prosecution. Finally, the idea that UAS will somehow replace manned aircraft in the SR mission was the source of most disagreement between manned respondents and unmanned respondents. Not surprisingly, manned respondents indicated that UAS would *not* replace manned aircraft while unmanned respondents were more likely to indicate UAS would replace manned aircraft.

Table 2. *Responses to Items Concerning Present and Future Roles of Manned and Unmanned Aircraft*.

Questionnaire Item	Respondent Type	Disagree	Agree	χ^2 (df = 1)
Items with Agreement Between Manned and Unmanned Respondents				
1. UAS will assume a more active role in SR mission than it has in the past.	Manned Unmanned	3% (1) 10% (3)	97% (33) 90% (28)	1.27
2.UAS operators will have to learn to develop the situation once a target has been identified	Manned Unmanned	6 % (2) 17% (5)	94% (32) 83% (25)	1.90
4. UAS have made significant contributions to manned helicopter SR operations	Manned Unmanned	12% (4) 26% (8)	88% (30) 74 % (23)	2.12
Item with Equal Frequencies of Agreement and Disagreement.				
5. The primary role of UAS is to provide airborne sensors for the manned helicopter crews, whose task it is to positively identify the target, determine hostile intent, and if necessary, destroy the target.	Manned Unmanned	44 % (15) 58% (18)	56% (19) 42% (13)	1.26
Items with Largest Differences Between Manned and Unmanned Responses				
3. UAS will eventually become an equal status player (vs. manned) in SR operations.	Manned Unmanned	71% (24) 23% (7)	29% (10) 77%(23)	14.25*
6. In the future, I see UAS completely taking over the SR role in tactical operations.	Manned Unmanned	94 % (32) 48% (15)	6% (2) 52% (16)	16.94*
7. UAS operators must assume a more active role in SR than merely providing an airborne sensor.	Manned Unmanned	23% (8) 3% (1)	77% (26) 97% (30)	5.60*
8. The replacement of the OH-58 and the AH-64D by unmanned weaponized surrogate is an unrealistic notion.	Manned Unmanned	24% (8) 73% (22)	76% (26) 27% (8)	15.88*

Notes. Cell counts in parentheses. Asterisks (*) indicate statistically significant χ^2 at $\alpha = .05$.

Appropriateness of Mission Skills for Manned Aircraft and Unmanned Aircraft

For the eight critical SR mission skills listed on the questionnaire, participants indicated whether the skill was best executed primarily by manned aircraft (Primarily Manned), primarily by unmanned aircraft (Primarily UAS), or by both manned aircraft and unmanned aircraft on an equal basis (UAS and Manned). The response frequencies to the eight SR skills by the manned respondents and the unmanned respondents are presented in Table 3. With the exception of Skill 8 (Target Handover), there were large differences in the frequencies of "UAS and Manned" responses between manned respondents and unmanned respondents. In other words, the manned respondents and unmanned respondents did not agree about the appropriateness of mission skills for both aircraft types. Once again, the patterns of responses for each skill fit into one of three categories.

Table 3. *Perceptions of the Appropriateness of Manned Aircraft and Unmanned Aircraft for Selected Scout-Reconnaissance Mission Skills.*

Mission Skills	Respondent Type	Responses Categories			
		Primarily Manned	Primarily UAS	UAS and Manned	χ^2 (df = 2)
Skills that Unmanned Respondents Viewed as Appropriate for UAS and Manned					
Actions on Contact	Manned	62% (21)	0% (0)	38% (13)	
	Unmanned	23% (7)	6% (2)	71% (22)	11.20
Downed Aircraft Recovery Operation	Manned	50% (17)	0% (0)	50% (17)	
	Unmanned	19% (6)	6% (2)	74% (23)	8.04
Fundamentals of Security	Manned	41% (14)	3% (1)	56% (19)	
	Unmanned	13 % (4)	10% (3)	77% (24)	7.01
Skills that Manned Respondents Viewed as Appropriate for UAS and Manned					
Aerial Observation	Manned	3% (1)	9% (3)	88% (30)	
	Unmanned	4% (1)	48% (15)	48% (15)	12.89
Fundamentals of Reconnaissance	Manned	9% (3)	9% (3)	82% (28)	
	Unmanned	3% (1)	35% (11)	61% (19)	7.17
Skills that Both Manned and Unmanned Respondents Viewed as Appropriate for UAS and Manned					
Laser Target Handoff to Ground	Manned	9% (3)	3% (1)	88 % (30)	
	Unmanned	3% (1)	26% (8)	71% (22)	7.55
Spot and SALUTE Reports	Manned	9% (3)	0% (0)	91% (31)	
	Unmanned	3% (1)	29% (9)	68 % (21)	11.80
Target Handover (visual/non laser)	Manned	9% (3)	0% (0)	91% (31)	
	Unmanned	0% (0)	13% (4)	87% (27)	7.15

Notes. Cell counts in parentheses. All χ^2 were statistically significant at $\alpha = .05$.

The first pattern of responses was characterized by unmanned respondents being more likely to indicate the skill as appropriate for both manned and unmanned aircraft than were manned respondents. This pattern of responses was evident for Actions on Contact, Downed Aircraft Recovery Operations, and Fundamentals of Security. Interestingly, for both manned respondents *and* unmanned respondents who did not indicate the skills as being appropriate for

UAS and Manned, the skills were perceived as being appropriate for "primarily manned" aircraft. This pattern of responses indicated that (a) these skills were perceived as traditional manned-aircraft roles and (b) UAS operators viewed these skills as appropriate for UAS, when teamed with manned aircraft.

The second pattern of responses was characterized by manned respondents being more likely to indicate the skill as appropriate for both manned and unmanned aircraft than were unmanned respondents. The skills that represent this pattern of responses were Aerial Observation and Fundamentals of Reconnaissance. For those unmanned respondents who did not indicate the skills were both UAS and Manned, the skills were more likely deemed appropriate for UAS than for manned aircraft. In sum, manned respondent clearly viewed these skills as appropriate for both manned and unmanned aircraft, but unmanned respondents were mixed about whether these skills were more appropriate for primarily UAS or both UAS and manned aircraft.

The final pattern of responses showed both manned respondents and unmanned respondents likely to indicate the skill as appropriate for both UAS and manned aircraft. The skills that represent this pattern of responses were Laser Target Handoff to Ground, Spot and size, activity, location, unit, time and equipment (SALUTE) Reports and Target Handover. With the exception of Target Handover, manned respondents were more likely than unmanned respondents to indicate that these skills were appropriate for both UAS and manned aircraft. In other words, even though the majority of both manned respondents and unmanned respondents indicated that these skills were appropriate for both UAS and manned aircraft, some unmanned respondents still viewed these skills as being primarily UAS.

Overall, the majority of respondents indicated that each SR mission skill was appropriate for both UAS and manned aircraft although the pattern of responses differed between manned respondents and unmanned respondent on all but one skill. Three skills (Actions on Contact, Downed Aircraft Recovery Operations, and Fundamentals of Security) were clearly perceived as traditional manned aircraft skills although the majority of unmanned respondents perceived these skills as also appropriate for UAS. The remaining five skills were seen as appropriate for UAS by both manned respondents and unmanned respondents even though there were some differences between the two types of respondents as to whether the skills were appropriate for primarily UAS or for both UAS and manned aircraft. Across all skills, the patterns of responses indicated that the majority of respondents saw all eight missions as most appropriate for manned and unmanned aircraft.

Open-Ended Comments

Respondents were given the opportunity to provide comments in order to clarify and complement their answers to the questionnaire (Appendix D). There were a total of 27 open-ended responses of varying length and complexity. Comments were reviewed and aggregated into categories. Because some included multiple concepts and ideas, categorization was challenging. Comments were not mutually exclusive as one respondent could generate a comment to each question, some questions, or none at all. Comments are summarized in Table 4 and are grouped by respondent's manned-unmanned status. Table 4 shows that most of the

detailed comments were from the manned community and that pilots generally agreed that MUM had definite advantages for tactical operations in that it provides complementary capabilities to the manned aircrew. However, pilots expressed concern that doctrine had not evolved to specify more precisely the respective roles of manned and unmanned team members. Some concern was expressed that current UAS operator training was not adequate for SR skills required for MUM-T operations. One OH-58D crewmember expressed concern that MUM-T may pose a hazard to the OH-58D crews due to workload and limitations imposed by its low altitude, low speed flight profile.

Although comments indicated that UAS was seen as a valuable asset in that its performance envelope allowed it to see a part of the battlefield that the pilot could not see, there was concern among pilots that complete reliance on electro-optical imagery, with its field of view and resolution limitations, provided no opportunity for unaided direct viewing of the battlefield (see Table 4). This issue was cited as one reason why UAS would not replace manned aircraft in the SR mission. Manned aircraft have a different operational environment and a different perspective on the battlefield. However, other factors, including operational costs, may influence the future of UAS use. One OH-58D crewmember stated that UAS probably would replace manned helicopters because UAS are less expensive to acquire and operate than their manned counterparts.

Unmanned operators, like helicopter pilots, emphasized the changing role of UAS from ISR to SR operations, and viewed MUM-T as a significant force-multiplier. There was not a high level of certainty among unmanned comments that UAS would replace manned aircraft in this role primarily because all command and operational decisions regarding MUM-T are made within the manned chain of command. One respondent remarked that the predominance of manned aviation (in the SR mission) may change if UAS is integrated into the Army Aviation community and accepted as an equal-status player. The need for more SR training and need for a means of practicing MUM-T skills at home station were also emphasized in unmanned operator's comments. Finally, there was some residual sentiment that the UAS mission was still primarily intelligence gathering and providing important information to all levels of command and that this should remain the primary UAS mission.

Table 4. C*ontent Categories for Open-Ended Comments*.

Responses of Manned Helicopter Pilots	
	Count
MUM has advantages. UAS is a force multiplier, a "third wingman" for MUM teaming. Synergy between manned and unmanned systems provides a complete picture of battlefield and can develop SA not possible with just one platform. UAS is tremendous asset to reconnaissance operations; specifically aerial surveillance. When matched together, manned and unmanned systems provide excellent capability to ground commanders.	10
UAS will not replace manned aircraft. Ability to find and track targets by UAS is good, but target must be verified by manned aircraft. UAS poorly suited for SR role. See world through TV screen, diminishing SA. Manned helicopter pilot must identify target, determine hostile intent, attack target. UAV operator has two functions: identify threat outside helicopter's visual range; hand off targets to manned aircraft. Manned aircraft provides close visual security and engages targets it identifies as threats. Provides instant attacks in support of ground units. MUM is good idea, but UAS operators are limited by training and cannot see the situation through the naked eye. We may interpret something one way through sensor, but when we come outside the cockpit to look around real situation understood. UAS cannot take over all functions of scout.	10
Need new doctrine to support MUM operations. UAS operators must to learn to develop situation and report to another entity. Need direct communications. Need common doctrine to ensure quality product. SR not currently UAS primary role but will be for those in the Full Spectrum CABs. Different UASs have different functions.	4
MUM is detrimental and dangerous for OH-58D aircrews. OH-58D has completely different flight profile compared to AH-64D (lower/slower)—heads down in cockpit and extra workload from MUM can get someone killed.	1
UAS serves the ground commander primarily	1
UAS will replace OH-58D for economic reasons	1
Limitations of UAS operator training. Doubtful that UAS operators possess same degree of forethought and understanding of ground operations as manned pilots.	1
Responses of UAS Operators	
Role of UAS will change. Change UAS mission statement to include (SR) operations, not just data collection. Use mission time for situational development. Weapon system and recon/security, not just backup. With improvements to UAS, both sides need to realize aerial assault potential infinite. Role of UAS is increasing. MUM teaming is future and present. Whether fire mission or target overwatch, MUM recon happens and is increasing,	5
UAS may or may not replace manned aircraft. UAS can potentially become primary to all air assets. Mission will always dictate use of UAS, but manned aircraft will be priority. Once UAS seen as part of Aviation community and not second-class citizen, changes may occur.	3
Need more training for SR/MUM mission. Need more training for MUM in Garrison. This benefits both UAS and manned assets so the first time operators and pilots experience it; it is in a controlled environment, not a combat zone. UAS will enhance Army's capability to find/fix/finish enemy, given proper training and capabilities.	3
UAS ISR. More communication and detailed Intel essential for UAS operations. UAS excels in staring at single target, not covering wide area. Shadow (RQ-7B) fails in observing stealthily. Primary role of UAS is to provide real-time SA to all levels of command.	2

Discussion

As UAS is integrated into Army Aviation, there are different perspectives on the actual role that pilotless aircraft will play in the near-term future, especially in the SR mission. The present research attempted to document differences in perceptions of the role of UAS in the SR mission between pilots of manned aircraft and UAS operators. These differences in perceptions can be summarized as the following. UAS personnel indicated that UAS will be able to perform many if not most of the roles addressed in the present research and currently performed by manned scout and attack helicopters. By contrast, pilots of manned helicopters indicated that the role of UAS primarily will be to assist and support the manned mission and not to supplant the manned role. What was not clear from the data was some of the possible reasons for the differences in perceptions and some of the possible means to reconcile these differences when MUM-T becomes reality.

In general, both the manned respondents and the unmanned respondents agreed that the role of UAS in the SR mission would expand. Even though many of the manned respondents indicated that UAS aircrews should be more than merely a passive sensor providing an overhead video feed, they did not see UAS as becoming equal-status players in the execution of SR missions. Likewise, most respondents, taken as a whole, indicated that both UAS and manned aircraft were appropriate to perform all eight SR mission skills. Even with the differences in perceptions of *individual* roles (i.e., primarily manned vs. primarily UAS), it nonetheless appeared that most of the mission skills were perceived as being appropriate for MUM-T.

The differences in perception found could be caused, in part, by the reality that UAS operators and manned aircraft pilots often do not interact as members of a team until they arrive in theater (Stewart et al., 2011). The lack of interaction between manned pilots and UAS operators may result in several sources of misperception between the two aircraft communities. On the one hand, UAS operators may perceive that they are potentially as capable as their manned counterparts but may be unaware of the specific skills required to perform the SR role until they experience this first hand in theater. On the other hand, many pilots of manned helicopters may not understand the unique advantages of UAS in the SR mission until they interact with UAS in live missions. In both instances, misperceptions are due to a limited knowledge of the other entity's capabilities and limitations.

In much the same way, it could be the case that differences in perceptions depended on the level of abstraction and time perspective of the question asked. The evolution of MUM-T may lead to the "psychology of inevitability" in which individuals adjust their attitudes to accommodate organizational and social change (Aronson, 2004). MUM-T will be part of future Army aviation operations and both manned and unmanned communities know that despite their perceptions of each other's limitations. The questionnaire items that pertained to the future role of UAS showed the most differences in perception (i.e., Items 3, 6, & 8) partially due to the fact that the future tactical role of UAS is still largely unknown. Perceptions of UAS roles in the abstract, especially over future time horizons, may be primarily ideological with no clearly known benchmarks, whereas perceptions of how standard SR missions are best executed are based upon instrumentality and practicality. Even though manned and unmanned aviators must learn to work together in MUM-T, the question remains as to exactly what are the team

members' roles. In that void, the different communities will define the others' roles based on their own understanding of task.

One of the most obvious sources of difference in perceptions is the demographic and experiential backgrounds of the two communities. Rotary-wing pilots are officers (warrant or commissioned), receive extensive training on aviation operations, and are specifically trained on SR skills in schoolhouse and at home station. Pilots also undergo extensive selection requirements and must demonstrate aptitudes and cognitive characteristics specific to aviation. By contrast, UAS operators are enlisted personnel or junior noncommissioned officers (NCOs) and are primarily trained on ISR skills. In addition, there currently is no formal aptitude test used for selecting UAS operators although prototype tests do exist (Bruskiewicz, Houston, Hezlett, & Ferstl, 2007). While UAS training is rigorous, it does not include the level of aviation skill or SR skills regularly practiced by rotary-wing pilots. These differences in background and training are necessarily going to produce differing perspectives on the nature of the SR mission and skills required to execute the mission. It may be important to note that the Air Force uses officers (not necessarily rated aviators) to operate UASs and that the Navy and Marine Corps use enlisted operators for some of its UAS, such as RQ-7B, and officers for more complex systems. It is not clear whether using officer UAS operators in the Army would eliminate difference in perceptions of UAS role in the SR mission. However, the question of just what kind of person should be a UAS operator and for what kind of UAS is an issue for all three U.S. armed services for which there are no simple answers.

Despite the differences in perceptions for the role of UAS in SR missions between manned aviators and unmanned aviators and the reasons for those differences, steps can be taken to prepare both aviation communities for MUM-T. First and foremost, is the advent of the FSCAB with one squadron consisting of 21 OH-58Ds and 8 RQ-7Bs. The stand-up of the FSCABs should allow UAS and manned aircrews to practice as teams before deployment. This training would enable manned and unmanned communities to address team training areas or issues before being required to execute live MUM missions. Another training environment for MUM-T training would be the Aviation Training Exercises (ATX) virtual exercise. Even though ATX is intended to be a staff exercise, the participation of aviators in the exercise make ATX a useful tool for aviation collective training such as MUM-T (Seibert, et al., 2012).

Of course preparation for MUM-T should begin in initial aviation training. Manned helicopters and UAS each have non-overlapping advantages and limitations, and these capabilities could be taught in the initial training of new pilots and UAS operators in order to provide a realistic perspective of MUM-T in the SR mission. Even though specific SR skills are taught in flight school (especially OH-58D Phase II training), few SR-specific skills are taught during initial UAS operator training (Stewart, et al., 2011). As a consequence, a stronger tactical-skills training program could be implemented at the UAS schoolhouse (Stewart et al.) that includes a broader set of MUM-T skills. Such a training should emphasize execution of those MUM-T mission skills identified in prior research as training-critical (e.g., Sticha, Howse, Stewart, Conzelman, & Thibodeaux, 2012) as well as SR mission planning and rehearsal. A critical part of that training program also would be the use of communication and coordination techniques appropriate to Army aviation. Another possibility would be the development of a joint training program with manned pilots that would focus on planning and execution of

simulated reconnaissance missions using networked simulation facilities currently in place. Any opportunity for joint training would be an essential first step in the socialization and assimilation of RQ-7B and OH-58D aircrews.

Taken together, the current findings provide important feedback to decision makers regarding the perceived present and future tactical roles of manned and unmanned aircraft by experienced operators of both aircraft types. Knowledge of current attitudes toward capabilities of UAS could provide insight on the part of training developers who must devise strategies for training manned and unmanned aircrews to work together as players in MUM-T. The findings also point to the need to more precisely specify respective roles of manned and unmanned team members for each SR mission skill before UAS can fully participate in MUM-T.

References

Aronson, E. (2004). *The social animal*. New York: Worth Publications.

Bruskiewicz, K.T., Houston, J.S., Hezlett, S.A., & Ferstl, K.L. (2007). *Development of a selection instrument for unmanned aerial system (UAS) operators.* (Technical Report 580). Minneapolis, MN: Personnel Decision Research Institute.

Goebel, G. (2010). *Early US target drones*. Retrieved July 6, 2011 from http://www.vectorsite.net/twuav_01.html

Seibert, M. K., Diedrich, F. J., Ayers, J. M., Dean, C., Zeidman, T, Bink, M. L., & Stewart, J. E. (2012). *Addressing Army aviation collective training challenges with simulators and simulations capabilities*. (ARI Research Report: In preparation). Fort Belvoir, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Stewart, J. E., Bink, M. L., Barker, W. C., Tremlett, M. L., & Price, D. (2011). *Training needs for RQ-7B unmanned aircraft system operators in the scout-reconnaissance role.* (ARI Research Report 1940). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (DTIC No. ADB367652).

Sticha, P. J., Howse, W. R., Stewart, J. E., Conzelman, C.E., & Thibodeaux, C. (2012). *Identifying critical manned-unmanned teaming skills for unmanned aircraft system operators*. (ARI Research Report: In preparation). Fort Belvoir, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

APPENDIX A

Data Collection Instrument

UAS Role in Scout-Reconnaissance Missions

This questionnaire is part of research being conducted by the US Army Research Institute for the Behavioral and Social Sciences to better understand current perceptions of the role of UAS in scout-reconnaissance missions. Please answer each item based on your experience with UAS capabilities and UAS operators. There is a section at the end of the questionnaire to provide any additional information or insights that may go beyond the content of the individual items.

For the following items, please indicate your response by placing an 'X' in the appropriate box.

1. UAS will assume a more active role in the scout-reconnaissance mission than it has in the past.

Strongly Disagree	Disagree	Agree	Strongly Agree
☐	☐	☐	☐

2. UAS operators will have to learn to develop the situation once a target has been identified.

Strongly Disagree	Disagree	Agree	Strongly Agree
☐	☐	☐	☐

3. UAS will eventually become an equal status player (vs. manned) in scout-reconnaissance operations.

Strongly Disagree	Disagree	Agree	Strongly Agree
☐	☐	☐	☐

4. UAS have made significant contributions to manned helicopter scout recon operations.

Strongly Disagree	Disagree	Agree	Strongly Agree
☐	☐	☐	☐

5. The primary role of UAS is to provide airborne sensors for the manned helicopter crews, whose task it is to positively identify the target, determine hostile intent, and if necessary, destroy the target.

Strongly Disagree	Disagree	Agree	Strongly Agree
☐	☐	☐	☐

6. In the future, I see UAS completely taking over the scout-reconnaissance role in tactical operations.

Strongly Disagree	Disagree	Agree	Strongly Agree
☐	☐	☐	☐

7. UAS operators must assume a more active role in scout-reconnaissance than merely providing an airborne sensor.

Strongly Disagree	Disagree	Agree	Strongly Agree
☐	☐	☐	☐

8. The replacement of the OH-58D and AH-64D by an unmanned weaponized surrogate is an unrealistic notion.

Strongly Disagree	Disagree	Agree	Strongly Agree
☐	☐	☐	☐

For the following skills, place an 'X' in the appropriate box if you believe the corresponding skill should be performed primarily by manned aircraft, by primarily by UAS, or by both manned and UAS on an equal basis.

Skill	Primarily Manned	Primarily UAS	UAS and Manned
Actions on contact.			
Aerial observation			
Downed aircraft recovery operations			
Fundamentals of reconnaissance			
Fundamentals of security.			
Laser target handoff to the ground			
Spot and SALUTE reports			
Target handover (visual/ non laser)			

Please add any additional comments you wish to make about the role of UAS in scout-reconnaissance missions:

APPENDIX B

Description of Critical Skills

1. **Actions on Contact:** *Actions on contact* are a series of combat actions often conducted simultaneously and executed upon contact with the enemy to develop the situation. Actions on contact are:
    - Deploy and report.
    - Evaluate and develop the situation.
    - Choose a course of action.
    - Execute selected course of action
    - Recommend course of action to higher commander

2. **Aerial Observation (AO):** Ensure UAS Operators understand fundamentals of AO in scout-reconnaissance (SR) and non-SR environments. During missions involving direct observation, UAS crew must be primarily concerned with detection, identification, location, and reporting.

3. **Downed Aircraft Recovery Operations:** Integrate UAS Operators into downed aircraft recovery operations as a reconnaissance asset and as a potential downed aircraft. Upon receipt of a downed aircraft report, consideration should be given to utilizing UAS in support of the recovery operations. Information regarding recovery of UAS vehicles should be provided to the Combat Aviation Brigade (CAB) to ensure that Downed Aircraft Recovery Team understands how to secure and recover UAS assets.

4. **Fundamentals of Reconnaissance:** Ensure UAS Operators understand the employment of the fundamentals of reconnaissance. These fundamentals include:
    - Ensure continuous reconnaissance.
    - Do not keep reconnaissance assets in reserve.
    - Orient on the reconnaissance objective.
    - Report information rapidly and accurately.
    - Retain freedom of maneuver.
    - Gain and maintain enemy contact.
    - Develop the situation rapidly.

5. **Fundamentals of Security:** Ensure UAS Operators understand how to utilize UAS assets to support the security of the Brigade Combat Team/CAB and supported forces.

6. **Laser Target Handoff to Ground:** Ensure UAS operators understand how to use their onboard laser target marker to handover a target to a ground unit.

7. **Spot Reports and SALUTE Reports:** Ensure UAS Operators understand standard reporting formats for information gained during UAS operations. UAS Operators have specific reports as they relate to intelligence gained from sensor payloads, but must be able to develop and send standard reports that can be immediately acted upon during SR operations.

8. **Target Handover (Visual/Non-laser):** UAS operators should be able to perform a target handover to ground and aviation forces when the use of a laser is not available. For attack helicopters, UAS operators should conduct a voice target handover using standard elements such as observer identification and warning order, target, location, description, and mark (if applicable). For target location for aviation and ground units, UAS Operator may reference from a known point such as terrain and cultural features, use grid coordinates, or operational graphics.

APPENDIX C

Background Information Questionnaire

Background Information

1. What is your rank? (e.g. CW 4, Captain, and/or Civilian)

   _____

2. What is your branch assignment?
   - ☐ Military Intelligence
   - ☐ Aviation
   - ☐ Other_____

3. When was your last tour operating in a combat zone?
   - ☐ Within the past year
   - ☐ Within the past three years
   - ☐ Four or more years ago
   - ☐ I have not operated in a combat zone

4. What type of aircraft did you primarily operate during your last tour?
   - ☐ Attack Helicopter
   - ☐ Observation Helicopter
   - ☐ UH-60
   - ☐ Heavy UAS (e.g., Predator, Sky Warrior)
   - ☐ Medium UAS (e.g. Shadow, Hunter)
   - ☐ Other UAS
   - ☐ None of the above (specify the system) _____

5. Mark the system(s) you are currently qualified to operate:
   - ☐ OH-58D
   - ☐ AH-64D
   - ☐ UH-60
   - ☐ Heavy UAS (e.g., Predator, Sky Warrior)
   - ☐ Medium UAS (e.g. Shadow, Hunter)
   - ☐ Other UAS system_____
   - ☐ None of the above (specify the system) _____

6. Mark the aviation unit missions you have experience with:
   - ☐ Attack
   - ☐ Reconnaissance/Security
   - ☐ Communications Relay
   - ☐ Medevac
   - ☐ Other (please specify) _____

7. Indicate the area(s) of operations you have experience with (e.g. Iraq, Afghanistan) :

APPENDIX D

Comments from Aviators and Operators

UH-60 Pilot- I don't believe a UAS will completely replace a manned vehicle. Being on site as a human creates overall better situational awareness.

AH-64 Pilot- UAS is a great visual source that helps with developing a situation. If needed I feel they can use force however, the dynamics are always changing and an aviators head is always on a swivel as opposed to a screen with one view. I don't see UAS operators taking the role of an aviator as much as I do see them as an additional asset to that pilot or ground commander.

AH-64 Pilot- UAS assets are a huge combat multiplier and will only strengthen air and ground commander's situation.

AH-64 Pilot- In reference to question #5: The primary role of UAS is to do whatever the ground commander needs him to do.

AH-64 Pilot- I would like to see UAS integrated almost like a 3rd wingman in communications/sights/digital traffic and target marking.

AH-64 Pilot- Excellent platforms that can be better integrated with manned assets, but requires the establishment of common doctrine to ensure a quality product.

AH-64 Pilot- Just to clarify question #5, the manned helicopter crews, positively identify the target, determine hostile intent, and if necessary destroy the target.

OH-58 Pilot-UAS is a valuable asset to Recon and Attack ops for situational awareness. However, I do not think UAS will replace manned helicopters, or at least it **should not**.

OH-58 Pilot- UAS **should not** operate at the same altitude as manned aircraft. Need direct communication with UAS. They are a great asset but **should not** replace manned aircraft. Need better integration with ground/air assets. I wish I could see their feed in cockpit, but have **no desire to actually control it.**

OH-58 Pilot- UAS will have an increased presence in reconnaissance operations. Assignment to recon and security missions requires knowledge of the recon security fundamentals. UAS operators will have to be able to develop the situation and report to another entity.

OH-58 Pilot- In my opinion, I don't believe UAS will "take-over" as the Scout on the battlefield, especially during actions on contact. However, I do believe they will be an effective force-multiplier during MUM operations.

OH-58 Pilot- In my experience the synergy between Manned and Unmanned systems provide a complete picture of the battlefield and can develop situational awareness that is not possible with just one platform or the other. The support provided to the ground

commander through the eyes of a scout with nearly 360 degrees of visibility along with weapons release capability gives him another fighting platform under his belt. The support provided by the UAS gives the ground commander nearly unlimited surveillance capability which can detect hostile intent undetected which allows him to get inside the enemy's decision making cycle. Together MUM allows the strengths of both systems to offset weaknesses of the other.

OH-58 Pilot- I believe that it is completely unrealistic for a UAS to take over the mission of an AH-64 or OH-58D. Having the ability to actually be in the "fight" or on/in/above the recon objective cannot be accomplished be a UAS whose perspective is through a TV screen no matter the size. Being able to see what is happening around the situation that is being viewed becomes difficult at best for a UAS operator. The individual who is viewing the screen may not and probably hasn't been actually in that situation overhead in a helicopter. The individual who is looking at the TV screen and interpreting what is happening needs to have a recon background so they truly understand what it means to recon and how to properly conduct it. Recon through a TV screen opposed to using your eyes is completely different. The OH and AH aviators know this first hand because we have sensor that require us to view a small display in the cockpit and use our eyes. We may interpret something one way through a sensor and when we come outside the cockpit to look around sometimes only then is the real situation understood. UAS may be good to possibly acquire a target, determine hostile intent, or to conduct aerial surveillance but I feel that that is the extent of the UAS. Concerning MUM in an OH-58D I believe that would be a detriment to the recon elements mission due to the additional work load and the required situational awareness that would be needed to conduct such a mission. I believe one thing that is completely missed in the MUM program concerning the OH-58D is that the Kiowa Warrior is in a completely different flight profile that the AH-64. The OH-58D is much lower and slower which makes being head down in the cockpit looking at a screen much more dangerous to the crew and team, which ultimately could lead to mission failure, a downed aircraft, killed aircrews, or not being as productive to the ground commander that is being supported. The OH-58D also has to fly to a target head on to engage. The AH can circle and/or have greater standoff in terms of distance and altitude from the enemy due to its weapon systems. The OH-58D's are often in mission/flight profiles so low that the aircrews need to climb to get over obstacles such as buildings, wires, trees, and terrain. This is all done to get the best details to develop the situation and report it to the commander being supported. **I believe MUM in and OH-58D will get someone killed either in training or in combat.**

OH-58 Pilot- I really believe that the **-58 will be replaced by UAS despite our successes in the Middle East. It's purely economics at this point - unfortunately.**

OH-58 Pilot- Remember that fundamentals of recon/scty are not tasks to be performed but rather principles we use in consideration when performing other missions (i.e., actions on contact, aerial observation).

OH-58 Pilot- I am somewhat limited on my knowledge of the capabilities of UAS platforms. However, based on experience from working with them, **UAS are a**

tremendous asset to reconnaissance operations; specifically aerial surveillance. Their long station time, almost undetectable profile, and ability to observe an area from a fixed pattern that requires far less workload than a manned system allows UAS to better focus on a specific area for longer. When matched together manned and unmanned systems can provide an excellent capability to ground commanders. The ability to find and track targets or gain overall situational awareness from a UAS is very good. The capability for UAS to engage specific point targets is also very good. However, the greatest benefit comes from mating the two systems together. A few different techniques are possible. First, UAS finds targets that are suspect, but must be verified visually by manned aircraft. Second, manned aircraft finds targets, then hands them off to UAS for long term surveillance while the manned aircraft departs allowing enemy to believe he is no longer observed. Finally, the designation by one platform for the other in the deliverance of guided munitions to allow massing of more firepower or increasing capabilities like greater standoff. I don't believe currently, that UAS can take the place of manned aircraft for actions on contact or security operations. The limits are both the UAS and their operators. Pilots in the scout community are trained in understanding ground operations and have the ability to see with the naked eye; allowing reaction quickly to dynamic situations. It is doubtful that UAS operators possess the same level of forethought that scout pilots do during kinetic operations. Again, this is due to both limits of looking through sensor screen and the training of operators. A good example of this is in the support of small unit actions in an urban environment. With manned systems and UAS overhead serving two distinct roles the capabilities are greatly enhanced. The UAS operator should have two main functions: the ability to have a large broad view and identify any threats or influences outside the visual range of the manned aircraft, and to observe from a direct look down capability specific points like a back alley and designate/ handoff targets to the manned aircraft or ground unit. The manned aircraft has two functions also. The first is to provide close visual security, such as roof top surveillance and be able to independently engage targets it identifies as threats. Second, is to provide nearly instant close combat attacks in support of the ground units. A UAV operator in this situation is far more limited to the action he can provide outside of informing the ground commander of a threat, while the manned aircraft simply does not have the dedicated straight lookdown capability that the UAS has.

OH-58 Pilot- I do not entirely agree with some of the questions as they are stated because they can be misleading. Question 8 for example, is not an unrealistic notion, but it is definitely in its infancy and is a long way from becoming a reality. Question 5 discusses what the pilot's view of a UAS primary role is, and simultaneously determine the role of the attack/recon mission. While what is listed is not their primary role, it is an important function, and with the development of the Full Spectrum Combat Aviation Brigade (FSCAB), the UAS that will be assigned to those units will have those tasks as their primary roles. Different classes of UAS fulfill different functions. Some are strictly surveillance; some are for gathering intelligence, etc. All of this information is in the public domain.

Comments from Unmanned Pilots:

Medium UAS- Must change mission statement of UAS in general to include operations as a major variable, not just data connection.

Medium UAS- My reason behind my thoughts of UAS not supporting contacts is for the simple fact of tunnel vision.

Medium UAS- As UAS becomes more autonomous and operators are able to be more reactive to the system/monitor, the mission time can be used more as a situational development. Weapon system and recon/security instead of just merely a backup to other systems. UAS can potentially be the primary to all Air Assets.

Medium UAS- There needs to be more training for Manned/Unmanned Teaming in Garrison. This benefits both UAS and manned assets so the first time the operators and pilots experience it is in a controlled environment and not in a combat zone with lives at stake.

Medium UAS- Mission will always dictate the use of an UAS. Manned aircraft will be priority (in my opinion).

Medium UAS- Once UAS's are seen as a <u>True</u> part of the Aviation Community and not as a second class citizen, changes may occur.

Medium UAS- More communication and detailed Intel is essential for UAS operations. UAS excel in staining at a single target not covering a wide area. The shadow specifically fails in observing stealthy.

Medium UAS- With continued improvements to UAS capabilities the mum aspect of operation both combat and noncombat both side need to realize this because when this happens our aerial assault potential is infinite.

Medium/Heavy UAS- The primary role of UAS is to provide real time situational awareness to all levels of command from ground to Air Operations.

Medium/Heavy UAS- The UAS capability will greatly enhance the Army's ability to find, fix, and finish the enemy, if given the proper training and capabilities.

Medium/Heavy UAS- The role of unmanned assets is increasing. Unmanned weaponization is a real concept and has been used in theater. While manned recon will never fade away manned teaming is the future and present. Whether it's a fire mission or target over watch, man and unmanned recon happens and is increasing.